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No. III.

A SAFE LAMP FOR MINERS.

The SILVER MEDAL was presented to Messrs. G. and W. BURSILL, No. 1 Queen's Head Lane, Islington, for their Safe Lamp and Life Apparatus for the use of Miners; a Drawing of which has been placed in the Collection of the Society.

No. 1 Queen's Head Lane, Lower Road, Islington.

SIR,

March 14, 1837.

HAVING, for some years past, been engaged with a view to the construction of an instrument which should diminish the dangers attendant upon mining, and more especially upon coal-working, and having brought our experiments to a successful conclusion, we beg to submit for your attention the accompanying communication, in which is contained a full description of our invention.

We are, Sir, &c &c.

A. AIKIN, Esq.

G. and W. BURSILL.

Secretary, &c. &c.

The object of this invention is to apply condensed atmospheric air to the double purpose of supplying the lamps of miners, and of affording to the miners themselves, in particular emergencies, pure atmospheric air for breathing, while exploring those parts of a coal mine that may happen to be rendered hazardous to life from the quantity of carbonic acid and other unrespirable gases that they may contain.

This lamp is completely insulated from the mine, the flame being enclosed in air-tight fittings, and its combustion being supported by fresh atmospheric air, condensed into close vessels, and then brought down into the mine. The foul air from the lamp is expelled into the mine in a perfectly secure manner; for, though it can no longer support combustion, and has nothing in its nature that can communicate light to the external air, yet it is doubly guarded; first, by passing through wire gauze, and then having to bubble through water. Thus the bare possibility of a spark from the flame passing the chimney, is totally prevented.

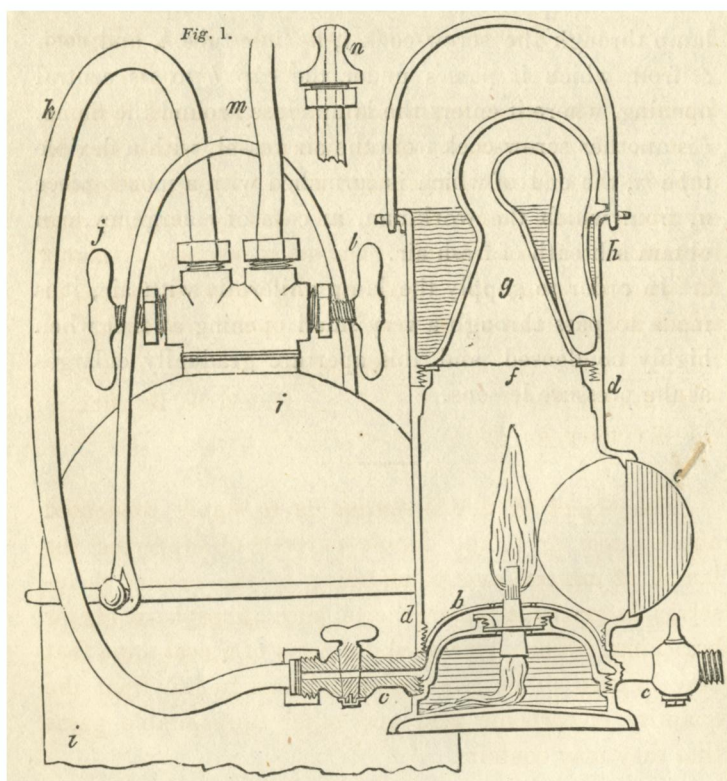


Fig. 1 represents the lamp, with the reservoir and the tube which connects them together. *a* is the oil vessel of the lamp, over which is screwed the cap or dome *b*, having a central aperture, in the middle of which the burner or wick-holder just rises through: in the opposite sides of this cap are fixed the two cocks, *cc*. The body of the lamp *dd*, with a lens *e* in its side, is screwed into the cap *b*. On the top of this are laid two or three plates of wire gauze *f*, over which is screwed the chimney *g*; the end of this chimney is bent downward, and is surrounded by a vessel *h* to contain water, into which the end dips. *ii* is part of a vessel made sufficiently strong to hold condensed atmospheric air; this it gradually imparts to the lamp through the screw-cock *j*, flexible tube *k*, and cock *c*, from which it passes under the cap *b* to its central opening, where it enters the lamp close around the flame. *l* is another screw-cock from the air vessel, with a flexible tube *m*, the end of which is furnished with a mouth-piece *n*, from which the workman, in case of emergency, can obtain a breath of fresh air.

In order to supply the lamp uniformly with air, it is made to pass through a very small opening at first when highly condensed, and this aperture gradually enlarges as the pressure lessens.

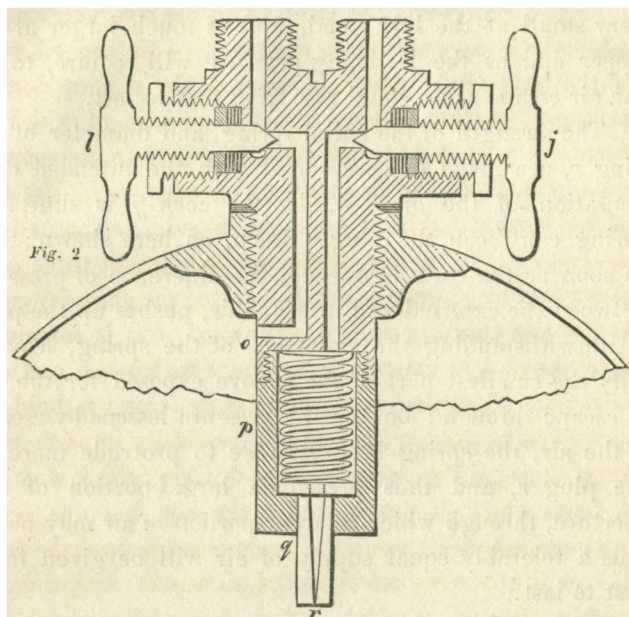


Fig. 2 is a section of the screw-cocks *j* and *l*, to shew their peculiar construction. The screws *j* and *l* have cylindrical portions passing through collars of leather, to keep them air-tight; their conical points shut or open their respective apertures. The cock *l* opens directly into the vessel *i*, through the aperture *o*. The cock *j* is the one from which the lamp is supplied, it therefore has a self-regulating aperture attached to it. The aperture of the cock enters the chamber *p*, made large enough to contain a spiral spring; at the bottom is another opening *q*, into which is nicely fitted the cylindrical plug *r*, as air-tight as possible consistently with sliding freely; on the top of this is a disk, on which the spiral-spring that fills the chamber *p* acts to thrust out the plug *r*. In the side of this plug is made a groove, as shewn in the figure,

very small at the lower end, and as much larger at the upper end as the lessening pressure will require, to let the air escape at an equal rate from first to last.

The strength of the spiral spring, and diameter of the plug *r*, are made to correspond with the intended condensation of the air. Whilst the cock *j* is shut, the spring can keep the plug *r* down, as here shewn; but as soon as the cock is opened, the difference of pressure between the external and internal air, pushes up the plug *r*, notwithstanding the resistance of the spring, leaving only the smallest part of the groove exposed for the air to escape through; but, as the pressure lessens by escape of the air, the spring becomes able to protrude more of the plug *r*, and thus present a large portion of the aperture, through which a larger portion of air may pass: thus a tolerably equal supply of air will be given from first to last.

When the vessel *i* is nearly exhausted, another vessel is connected with the other cock *c*, fig. 1, ready to be let on before the other is taken away.